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Observations upon Pollen Measurements.*

Of forty-one kinds of pollen taken at random and included in twenty orders, sixteen were isodiametric or spherical in shape, while twenty-five were with unequal diameters and generally oval in outline. The range in size in the isodiametric sorts was from 13–17 μ in *Onosmodium molle* to 110–117 μ in *Geranium maculatum*, and 130–138 μ in *Œnothera biennis*, which latter has, however, a spherical center with a number of large broad projections.

In the groups with unequal diameters the range of sizes is practically the same as given above, namely: 13–20 μ by 27–37 μ in *Steironema lancolata* to 45–50 μ by 120–135 μ in the Day Lily.

In making the record for each sort, the shortest as well as the longest distance was taken in each case and the grains were measured dry and again after becoming thoroughly wet with water.

Returning to the spherical group, the average of all the shortest diameters for the whole sixteen is 57.7 μ and for the longest 66.3 μ, thus giving a range of 8.6 μ. By taking the similar parallel series of measurements for wet grains the average for the shortest diameters is 68.6 μ and the longest 74.5 μ, or a variation of 5.9 μ. The average of the two averages for the dry measurements give 62 μ, while the same of wet grains is 71.55 μ, thus giving the increase from the addition of water of 9.55 μ, or 15.4%.

Turning now to the oval group, the average of the short diameter is 26.2 μ and of the long 48.4 μ; the same when wet are 34.9 μ and 42.5 μ respectively. In other words, there is 33.2% increase of the short diameter in the wetting, while the decrease in the longer diameter is 12.2%!

Pollen when dry, that is, freshly taken from the dehisced anther, shows some things not seen in the same after it has become wet. Of course the natural shape of the dry pollen is destroyed by the wetting process—as the above figures plainly show. Many grains have characteristic folds which are lost from view when liquid expands the coats. Only one of these folds is usually seen in side view, but by looking at one end there are

* Read at the Cleveland meeting of the A. A. A. S., Aug., 1888.

usually three observed. Some grains, like many kinds of mint pollen, are flat, that is, somewhat flax-seed shaped. In *Monarda fistulosa*, for example, the grains are 55–56 $\mu \times 64$–67 μ when viewed flatwise, and each grain is traversed by three folds, making the grain resemble a miniature muskmelon. When water is added the grain changes its shape with surprising rapidity, the longer diameter becomes the shorter and the shorter the longer, with little variation in the original figures. Dry pollen has the outer coat uniform, while in the wet grains there may be broad belts or lines of a different exterior. The pores are not usually so evident in the dry pollen as when they are wet. It is more difficult to get a satisfactory measurement of a dry grain, as it may be partly collapsed or the light so broken that no distinct outline is seen.

It seems evident that the full and perfect measurement of a pollen grain requires that it be taken twice; once when dry, that is, in the condition when ready for passage from dehisced anther to stigma and again when fully swollen by the imbibition of water, and both figures should be given with the conditions for each.

Rutgers College. BYRON D. HALSTED.

Botanical Notes.

Notelets.—Last summer I noticed *Tragopogon porrifolius* established at West Point, N. Y. *Hieracium aurantiacum*, known now some ten years in the vicinity of Providence, is spreading slowly in this vicinity, and I have recently learned of its appearance at Lebanon, N. Y. Mr. Bennett tells me that *Humulus Japonicus* threatens to be a bad weed hereabouts. *Forsythia suspensa* has flowered here, out of doors all winter.

On Feb. 26th I found a clump of *Houstonia cœrulea* in full flower. This is my earliest recorded date for Providence in 26 years. *Acer dasycarpum* had then been in bloom some days.

PROVIDENCE, R. I. W. W. BAILEY.

Solanum rostratum was brought to me here last fall gathered near the D. L. & W. R. R. tracks in the village. *Blephilia ciliata* has been found by one of my students in a wild place at Binghamton.

WAVERLY, N. Y. C. F. MILLSPAUGH.